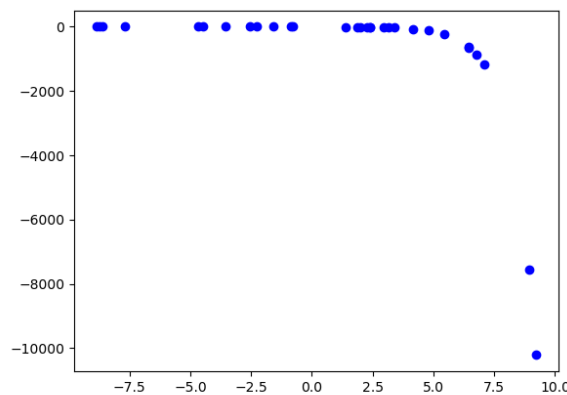


1. Determine the appropriate model for the graph of points below.



- A. Non-linear Power model
- B. Exponential model
- C. Logarithmic model
- D. Linear model
- E. None of the above

- 
2. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 24 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

- A. About 12 percent
- B. About 11 percent
- C. About 3 percent
- D. About 7 percent
- E. None of the above

3. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 6 many cases reported, but the number of confirmed cases has tripled every 5 days. How long will it be until there are at least 1000000 confirmed cases?*

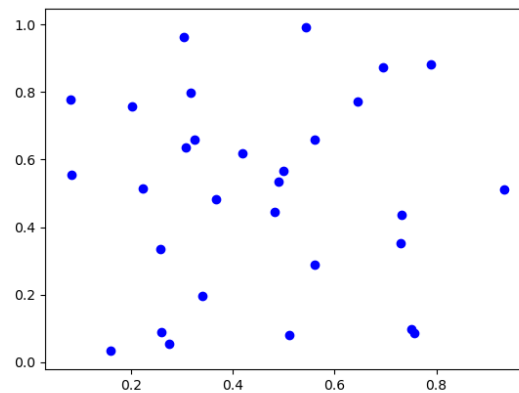
- A. About 25 days
  - B. About 61 days
  - C. About 55 days
  - D. About 24 days
  - E. There is not enough information to solve the problem.
- 

4. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 22 liter 18 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 18 percent and 32 percent solutions, what was the amount she used of the 32 percent solution?*

- A. 22.00liters
  - B. 11.00liters
  - C. 0.00liters
  - D. 11.84liters
  - E. There is not enough information to solve the problem.
- 

5. Determine the appropriate model for the graph of points below.



- A. Exponential model
- B. Logarithmic model
- C. Linear model
- D. Non-linear Power model
- E. None of the above

- 
6. For the information provided below, construct a linear model that describes her total budget,  $B$ , as a function of the number of months,  $x$  she is at UF.

*Aubrey is a college student going into her first year at UF. She will receive Bright Futures, which covers her tuition plus a \$400 educational expense each year. Before college, Aubrey saved up \$9000. She knows she will need to pay \$1000 in rent a month, \$40 for food a week, and \$64 in other weekly expenses.*

- A.  $B(x) = 9000x + 400$
- B.  $B(x) = 9400 - 1416x$
- C.  $B(x) = 400x + 9000$
- D.  $B(x) = 9400 - 1104x$
- E. None of the above.

7. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 4 many cases reported, but the number of confirmed cases has doubled every 3 days. How long will it be until there are at least 1000 confirmed cases?*

- A. About 10 days
  - B. About 24 days
  - C. About 9 days
  - D. About 17 days
  - E. There is not enough information to solve the problem.
- 

8. The temperature of an object,  $T$ , in a different surrounding temperature  $T_s$  will behave according to the formula  $T(t) = Ae^{kt} + T_s$ , where  $t$  is minutes,  $A$  is a constant, and  $k$  is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature,  $T$ , based on the amount of time  $t$  (in minutes) that have passed. Choose the correct constant  $k$  from the options below.

*Uranium is taken out of the reactor with a temperature of  $130^\circ\text{C}$  and is placed into a  $20^\circ\text{C}$  bath to cool. After 29 minutes, the uranium has cooled to  $64^\circ\text{C}$ .*

- A.  $k = -0.03736$
  - B.  $k = -0.02224$
  - C.  $k = -0.02289$
  - D.  $k = -0.03266$
  - E. None of the above
- 

9. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 34 percent more chips to their cylinder cans*

*and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

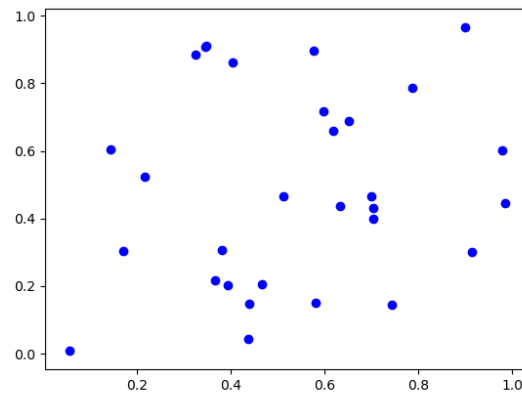
- A. About 10 percent
  - B. About 16 percent
  - C. About 3 percent
  - D. About 17 percent
  - E. None of the above
- 

10. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 24 liter 24 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 17 percent and 39 percent solutions, what was the amount she used of the 39 percent solution?*

- A. 12.00liters
  - B. 7.64liters
  - C. 16.36liters
  - D. 15.04liters
  - E. There is not enough information to solve the problem.
- 

11. Determine the appropriate model for the graph of points below.



- A. Exponential model
- B. Linear model
- C. Logarithmic model
- D. Non-linear Power model
- E. None of the above

- 
12. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 31 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

- A. About 9 percent
- B. About 3 percent
- C. About 14 percent
- D. About 16 percent
- E. None of the above

- 
13. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 3 many cases reported, but the number of confirmed cases has tripled every 5 days. How long will it be until there are at least 10000 confirmed cases?*

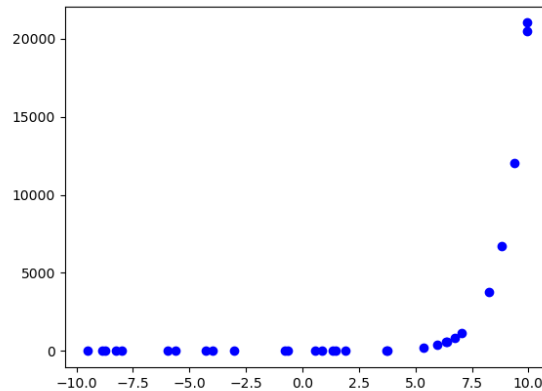
- A. About 37 days
  - B. About 41 days
  - C. About 22 days
  - D. About 21 days
  - E. There is not enough information to solve the problem.
- 

14. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 28 liter 19 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 5 percent and 27 percent solutions, what was the amount she used of the 5 percent solution?*

- A. 17.82liters
  - B. 10.18liters
  - C. 14.00liters
  - D. 11.65liters
  - E. There is not enough information to solve the problem.
- 

15. Determine the appropriate model for the graph of points below.



- A. Non-linear Power model
- B. Linear model
- C. Logarithmic model
- D. Exponential model
- E. None of the above

- 
16. The temperature of an object,  $T$ , in a different surrounding temperature  $T_s$  will behave according to the formula  $T(t) = Ae^{kt} + T_s$ , where  $t$  is minutes,  $A$  is a constant, and  $k$  is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature,  $T$ , based on the amount of time  $t$  (in minutes) that have passed. Choose the correct constant  $k$  from the options below.

*Uranium is taken out of the reactor with a temperature of  $100^\circ\text{C}$  and is placed into a  $10^\circ\text{C}$  bath to cool. After 21 minutes, the uranium has cooled to  $37^\circ\text{C}$ .*

- A.  $k = -0.02800$
- B.  $k = -0.02854$
- C.  $k = -0.06235$
- D.  $k = -0.04752$
- E. None of the above



17. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 8 many cases reported, but the number of confirmed cases has doubled every 2 days. How long will it be until there are at least 1000000 confirmed cases?*

- A. About 10 days
  - B. About 34 days
  - C. About 24 days
  - D. About 9 days
  - E. There is not enough information to solve the problem.
- 

18. Using the scenario below, model the population of bacteria  $\alpha$  in terms of the number of minutes,  $t$  that pass. Then, choose the correct approximate (*rounded to the nearest minute*) replication rate of bacteria- $\alpha$ .

*A newly discovered bacteria,  $\alpha$ , is being examined in a lab. The lab started with a petri dish of 3 bacteria- $\alpha$ . After 1 hours, the petri dish has 15 bacteria- $\alpha$ . Based on similar bacteria, the lab believes bacteria- $\alpha$  doubles after some undetermined number of minutes.*

- A. About 286 minutes
  - B. About 238 minutes
  - C. About 47 minutes
  - D. About 39 minutes
  - E. None of the above
- 

19. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 38 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that*

*the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

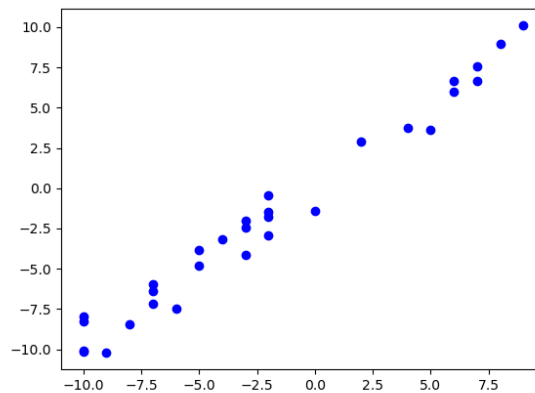
- A. About 19 percent
  - B. About 17 percent
  - C. About 11 percent
  - D. About 3 percent
  - E. None of the above
- 

20. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 29 liter 21 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 19 percent and 31 percent solutions, what was the amount she used of the 31 percent solution?*

- A. 4.83liters
  - B. 24.17liters
  - C. 10.44liters
  - D. 14.50liters
  - E. There is not enough information to solve the problem.
- 

21. Determine the appropriate model for the graph of points below.



- A. Linear model
- B. Logarithmic model
- C. Exponential model
- D. Non-linear Power model
- E. None of the above

- 
22. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 41 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

- A. About 20 percent
- B. About 19 percent
- C. About 12 percent
- D. About 3 percent
- E. None of the above

- 
23. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 4 many cases reported, but the number of confirmed cases has quadrupled every 4 days. How long will it be until there are at least 100000 confirmed cases?*

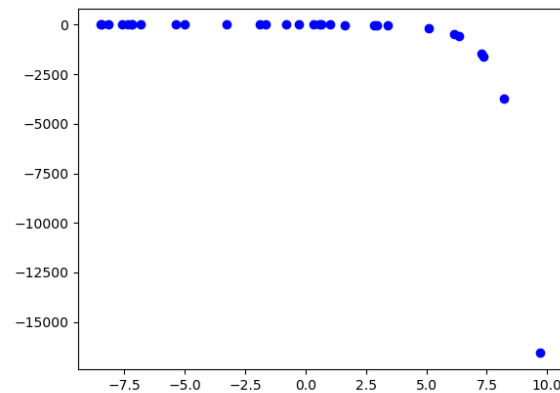
- A. About 20 days
  - B. About 17 days
  - C. About 41 days
  - D. About 30 days
  - E. There is not enough information to solve the problem.
- 

24. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 29 liter 21 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 12 percent and  $3\frac{1}{4}$  percent solutions, what was the amount she used of the 12 percent solution?*

- A. 17.14liters
  - B. 11.86liters
  - C. 14.50liters
  - D. 13.53liters
  - E. There is not enough information to solve the problem.
- 

25. Determine the appropriate model for the graph of points below.



- A. Linear model
- B. Exponential model
- C. Non-linear Power model
- D. Logarithmic model
- E. None of the above

- 
26. For the scenario below, model the rate of vibration (cm/s) of the string in terms of the length of the string. Then determine the variation constant  $k$  of the model (if possible). The constant should be in terms of cm and s.

*The rate of vibration of a string under constant tension varies based on the type of string and the length of the string. The rate of vibration of string  $\omega$  increases as the square length of the string decreases. For example, when string  $\omega$  is 2 mm long, the rate of vibration is 27 cm/s.*

- A.  $k = 675.00$
- B.  $k = 108.00$
- C.  $k = 1.08$
- D.  $k = 6.75$
- E. None of the above.

27. Solve the modeling problem below, if possible.

*A new virus is spreading throughout the world. There were initially 3 many cases reported, but the number of confirmed cases has tripled every 5 days. How long will it be until there are at least 100000 confirmed cases?*

- A. About 28 days
- B. About 48 days
- C. About 53 days
- D. About 27 days
- E. There is not enough information to solve the problem.

---

28. For the scenario below, find the variation constant  $k$  of the model (if possible).

*In an alternative galaxy, the square of the time,  $T$  (Earth years), required for a planet to orbit Sun  $\chi$  increases as the cube of the distance,  $d$  (AUs), that the planet is from Sun  $\chi$  increases. For example, when Ea's average distance from Sun  $\chi$  is 2, it takes 70 Earth days to complete an orbit.*

- A.  $k = 39200.000$
- B.  $k = 6.641$
- C.  $k = 4.028$
- D.  $k = 612.500$
- E. Unable to compute the constant based on the information given.

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29. For the scenario below, use the model for the volume of a cylinder as  $V = \pi r^2 h$ .

*Pringles wants to add 36 percent more chips to their cylinder cans and minimize the design change of their cans. They've decided that*

*the best way to minimize the design change is to increase the radius and height by the same percentage. What should this increase be?*

- A. About 11 percent
- B. About 18 percent
- C. About 3 percent
- D. About 17 percent
- E. None of the above

---

30. Solve the modeling problem below, if possible.

*In CHM2045L, Brittany created a 19 liter 15 percent solution of chemical  $\chi$  using two different solution percentages of chemical  $\chi$ . When she went to write her lab report, she realized she forgot to write the amount of each solution she used! If she remembers she used 7 percent and 19 percent solutions, what was the amount she used of the 7 percent solution?*

- A. 8.99liters
  - B. 12.67liters
  - C. 9.50liters
  - D. 6.33liters
  - E. There is not enough information to solve the problem.
-